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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,616	10/14/2003	Srinivasan Venkatesan	2091	4227

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EXAMINER	
WARTALOWICZ, PAUL A	
ART UNIT	**PAPER NUMBER**
1754	
MAIL DATE	**DELIVERY MODE**
07/05/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/684,616	VENKATESAN ET AL.	
	Examiner	Art Unit	
	Paul A. Wartalowicz	1754	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. ____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Response to Arguments

Applicant's arguments filed 4/13/07 have been fully considered but they are not persuasive.

Applicant argues the rejection of '033 in view of '806 ignores the fact that the process/apparatus of the '033 reference produces pure hydrogen gas and therefore, one would not have looked to the '806 reference in an attempt to purify the hydrogen stream of the '033 reference because it is already in a pure form when created.

However, that '033 produces hydrogen in a pure form does not teach away from using the hydridable alloys of the '806 reference. The '033 reference teaches an alloy of transition metals (specifically titanium group, cobalt, nickel, copper, manganese, and chromium metals) that are catalysts that catalyze the chemical reaction and aid in the hydrolysis of water by adsorbing hydrogen on their surface (col. 6). The '806 reference teaches a hydridable alloy of at least two elements of iron, titanium, nickel, manganese, and magnesium (col. 3). These two references teach a hydridable metal alloy with overlapping components such that the hydridable metal alloys of the two references are substantially similar and would exhibit substantially similar properties. One of ordinary skill in the art would expect the hydridable metal alloys of the '806 reference to be stable in the liquid environment of the '033 reference for this reason. It is not the position of the Office that any method of storing hydrogen will work in the method/apparatus of '033.

Additionally, applicant argues that the '033 reference specifically rejects the use of metal hydride storage of hydrogen and that the '033 reference is an attempt to avoid the storage of hydrogen in metal hydrides and to reincorporate such a storage technique in the teachings of the '033 reference specifically defeats the intended benefit of the method/apparatus thereof.

However, the '033 reference teaches an alloy of transition metals (specifically titanium group, cobalt, nickel, copper, manganese, and chromium metals) that are catalysts that catalyze the chemical reaction and aid in the hydrolysis of water by adsorbing hydrogen on their surface (col. 6). The excerpt recited by applicants at column 1, lines 45-54 does not appear to be teaching away from using chemical compounds to chemically react with water or other species to generate hydrogen or reversibly adsorb and then release hydrogen have deficiencies, but instead stating that the prior art methods that use chemical compounds to chemically react with water or other species to generate hydrogen or reversibly adsorb and then release hydrogen have deficiencies.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-4, 6, 7, and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 6534033) in view of Peterson et al. (U.S. 4696806).

Amendola et al. teach a process for a hydrogen generation system (col. 3, lines 20-25) comprising a reservoir containing fresh metal hydride solution (col. 14, lines 31-35), and a pumping fresh metal hydride into a catalytic chamber (col. 14, lines 30-33) and a reservoir for storing hydrogen (col. 14, lines 34-35, 48-51) and a flexible tubing (catalytic chamber, col. 14, lines 30-33)) connecting the fresh hydride reservoir and the hydrogen storage reservoir wherein hydrogen is produced from hydride solution (col. 14, lines 40-49). Amendola et al. do not teach a metal hydride bed in second container, said contacting promoting a reaction between in said slurry, said reaction producing atomic hydrogen and byproducts, wherein at least a portion of said atomic hydrogen is absorbed and stored by said metal hydride bed.

Peterson et al., however, teach a process for recovering hydrogen comprising a metal hydride bed that absorbs hydrogen then vents the hydrogen as a hydrogen rich stream (col. 4, lines 58-61).

Therefore, it would have been obvious to one of ordinary skill in the art to provide the metal hydride bed in Amendola et al. in order to absorb hydrogen and vent a hydrogen rich stream as taught by Peterson et al. (col. 4, lines 58-61) in a similar process for producing and storing hydrogen.

As to claims 2, 3, 6, 7, and 11; Amendola et al. teach a chemical hydride slurry comprising sodium borohydride or potassium borohydride or lithium borohydride as the metal hydride (col. 3, lines 50-60), sodium hydroxide or lithium hydroxide or potassium hydroxide as the stabilizing agent (col. 5, lines 5-10) and water (col. 4, lines 36-37). Amendola et al. also teach venting hydrogen to a hydrogen storage tank (col. 14, lines 48-51).

As to the limitations in claim 4, Amendola et al. teach a process for producing hydrogen as described above but fail to teach pumping said slurry and said byproducts from said second container into said first container through a second flow communication between said first container and said second container. Peterson et al., however, teach that the pump can reverse direction to empty the catalyst changer (col. 14, lines 10-15). Therefore, it would have been obvious to one of ordinary skill in the art to provide the process of draining the catalyst chamber (col. 14, lines 10-15) in the metal hydride bed process in order to control the process of producing hydrogen in a similar process as the applicant.

Claims 5 and 13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 6534033) in view of Peterson et al. (U.S. 4696806) and Rosner (U.S. 5228529).

Amendola et al. teach a process for recovering hydrogen as described above. Amendola et al. fail to teach a process in which pumping said slurry from said first container to said second container until said slurry is free of hydrogen and a valve set in first flow communication when said slurry is free of hydrogen.

As to claim 5, Rosner, however, teaches a process for producing hydrogen gas in which the magnesium anode is depleted of hydrogen in the process of producing hydrogen (col. 4, lines 47-52) for the purpose of carrying out the process to completion.

Therefore, it would have been obvious to one of ordinary skill in the art to have provided the depletion of the starting material with hydrogen content in Amendola et al. in order to carry out a similar process to completion as taught by Rosner.

As to claim 13, Rosner teaches control valves in the apparatus of figure 1 for the purpose of controlling flow of gases through the conduits (col. 6, lines 58-64).

Therefore, it would have been obvious to one of ordinary skill in the art to have provided control valves in the process of Amendola et al. in order to control the flow of streams in the apparatus (col. 6, lines 58-64) as taught by Rosner.

Claims 8-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 6534033) in view of Peterson et al. (U.S. 4696806) and Ovshinsky et al. (U.S. 5277999).

Amendola et al. teaches a process for producing hydrogen as described above. Amendola et al. fail to teach hydrogen storage material comprising an alloy selected from AB, A_2B, AB_2, and AB_5; and Mg-Ni, Mg-Cu, Ti-Fe, Ti-Ni, Mm-Co, Ti-Mn, Ti-V, Ti-Cr, and Mn-Ni based alloys and $Ti_{Q-Z}Zr_XMn_{Z-Y}A_Y$ wherein A comprises at least one of V, Cr, Fe, Ni, or Al, wherein Q is between 0.9 and 1.1, X is between 0.0 and 0.35, Y is between 0.6 and 1.8, Z is between 1.8 and 2.1.

Ovshinsky et al. teach alloys comprising A_2B, AB_2, and AB_5 (col. 8, lines 65-66) and alloys comprising V-Ti based allows including $V_{18}Ti_{15}Zr_{18}Ni_{29}Cr_5Co_7Mn_8$ (col. 9, lines 20-34) that exhibit extremely high storage capacity (col. 9, lines 4-7).

Therefore, it would have been obvious to one of ordinary skill in the art to have provided the afore mentioned hydrogen storage materials (col. 9, lines 20-34) in Amendola et al. in order to carry out a process with extremely high storage capacity (col. 9, lines 4-7) as taught by Ovshinsky et al.

Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Amendola et al. (U.S. 6534033) in view of Peterson et al. (U.S. 4696806) and Werth (U.S. 5690902).

Amendola et al. teach a process for producing hydrogen as described above. Amendola et al. fail to teach forcing unabsorbed hydrogen to a fuel cell.
Werth, however, teaches a process for producing hydrogen (col. 1, lines 11-15) and that it is well known to use hydrogen generated for supplying a fuel cell (col. 9, lines 25-30). Therefore, it would have been obvious to one of ordinary skill in the art to have provided hydrogen being supplied to a fuel cell in Amendola et al. in order to supply hydrogen to

a well known apparatus (fuel cell, (col. 9, lines 25-30) in a similar process for producing hydrogen as taught by Werth.

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Paul A. Wartalowicz whose telephone number is (571) 272-5957. The examiner can normally be reached on 8:30-6 M-Th and 8:30-5 on Alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Paul Wartalowicz
June 26, 2007

Steven Bos
Primary Examiner
A.U. 1754